



TECHNOLOGICAL DEVELOPMENT

**HOW TO CHANGE PERSPECTIVE
ACCORDING TO THE MARKET DEMAND**

FOCUS ON ECOLOGICAL FOOTPRINT AND CONSUMPTION

index

SUMMARY	3
TARGETS	4
END-OF-LINE IN PACKAGING BETWEEN INNOVATION AND SUSTAINABILITY	5
EFFICIENT DESIGN TO REDUCE CONSUMPTION AND MAINTENANCE	6
HOW THE NEED FOR SUSTAINABILITY CHANGES BUSINESS MODELS	8
THE CONTRIBUTION OF TOSA GROUP: "TO SEE WHERE OTHERS SIMPLY LOOK"	9
AN ALL-ROUND ECO-FRIENDLY CHOICE	10
RELIABILITY AND LONGEVITY OF END-OF-LINE MACHINES	10
FUTURE PROSPECTS: ENERGY REUSE AND DEFORMABLE PAPER	11
CONCLUSIONS	13
FINAL KEYPOINTS	14



summary

Sustainability is a commitment companies are taking on in an increasingly responsible way, particularly in the packaging industry.

On the one hand it is driven, with regard to the materials used, by consumer demands and current regulations, and on the other hand it is also a demand strongly felt by manufacturers in relation to the need to reduce material and energy consumption. This paper offers an all-round discussion of sustainability of end-of-line machines, presenting the experience of Tosa Group; the company operates in 115 countries from business sites in France, Spain and soon in the United States, and has sold more than ten thousand machines.

It is a dynamic and young business where the average age is around 35 years, growing rapidly with a turnover of approximately 22.5 million Euro, despite the present difficult material procurement situation in this industry.

We shall consider in detail, how a sustainable choice is necessarily connected with a continuous search for innovative solutions, both in the design phase of the machines and to increase the efficiency of production processes.


targets

HIGHLIGHT
THE IMPORTANCE
OF SUSTAINABILITY
IN THE END-OF-LINE

ILLUSTRATE
HOW TECHNOLOGICAL INNOVATION IS
THE KEY TO REDUCING ENERGY AND
RAW MATERIAL CONSUMPTION

PRESENT
TOSA GROUP'S VISION
REALISED IN THE DESIGN
OF WRAPPING MACHINES





The End-of-Line in the Packaging Industry between Innovation and Sustainability

In a recent report^[1], PMMI (Packaging Machinery Manufacturers Institute) reviewed today's trends in packaging and their influence on the features of end-of-line machines.

Trends range from quick format changes to suit a specific product, to modular solutions to integrate into existing lines: from user-friendly interfaces also suitable for less skilled workers, to the possibility to collect useful data for the monitoring of the system and the application of a proactive approach, up to a greater and greater demand to reduce both consumption and use of materials.

[1] End of Line Equipment: Purchasing Trends and Design Insights”, 2021

In particular, three guiding principles are driving innovation of end-of-line machinery:

- Lighter packaging obtained reducing raw materials used,
- Increased post-consumer recycled content (PCR), also in view of the passing of a European law requiring to implement the production of bottles using a minimum 25% of recycled plastics by 2025;
- Reduction of energy usage in packaging operations, e.g., decreasing reciprocating motion, integrating frequency checks of motorised motion, using shrink-wrapping systems, which consume up to 90% less energy than older machines, or improving the performance of machines through planned stops and a regular maintenance.

Sustainable packaging and sustainable processing offer substantial benefits, from cost savings to optimization of a business' carbon footprint. However, investing in innovation and research is paramount, also to be able to meet protection and safety standards while ensuring practical usability.

EFFICIENT DESIGN TO REDUCE CONSUMPTION AND MAINTENANCE

Tosa Juracan
Wrapping
Machine

Sustainability as a philosophy applied in the machine design process means that every device needs a minimum maintenance, total costs shall be optimized, product-processing time reduced while ensuring safety and easy cleaning.

As a practical example of application of said principles, let us consider some specific elements of Tosa Juracan, one of Tosa Group's flagship wrapping machines.

This machine model features toothed belts to convey lifting components which, unlike chains, ensure a longer and maintenance free life cycle, direct drives to lift the rotating



ring without mechanical transmissions, as well as rubber sliding wheels, with very long lubrication intervals.

Furthermore, the motor and the lifting shaft of the rotating ring are mounted on the ground to prevent maintenance and inspection operations at height, which is potentially dangerous and requires platforms and lifting equipment.

The motorised top presser has also been designed to reduce maintenance costs and time and ensure top safety during operation thanks to an anti-fall system and a fail-safe design, engineered to prevent failures causing damages to workers or to other systems connected with or working near it.

In the interests of reducing consumption, the wrapping machine is equipped with a film pre-stretching unit that allows to extend it with up to a 400% of pre-stretch ratio. It allows reducing the amount of material used on the finished product, ensuring load holding and protection during transport.

For this kind of machines, the “Smart Data Gathering System” by TOSA Group plays an important role, as it collects data such as film usage, actual average pre-draft, loading area, wrapping programme.

Furthermore, the machine has the ability to check its own health conditions: thanks to vibration meters and other sensing devices, the machine monitors key parts, like motors, belts and pre-stretch carriage in order to foresee and prevent potential future damages.

This active control on machine operations maximises its performance and longevity; the user-friendly graphic interface and operation display guide the operator through troubleshooting in a clear way, showing pictures, descriptions, causes and solutions.

Considering the great amount of useful data the machine can capture, which customers could use for a detailed analysis, TOSA Group developed “T-Hypothalamus”, a cloud-based software platform that can interconnect the

machine to a company network to receive status reports, updates and maintenance alerts as well as allowing an easy and immediate access to production, performance and carbon footprint data. Last but not least, the “Smart Wrapping” system technology can automatically optimise the film distribution during the wrapping cycle to minimize film consumption and actively control tension on the corners of a palletized load, all of it shown on the operator panel.

HOW THE NEED FOR SUSTAINABILITY CHANGES BUSINESS MODELS

In the last few years, manufacturing and logistics sectors went through some major changes. The market is now global and logistics plays a critical role even thanks to the huge development of e-commerce.

All this had a significant impact on packaging machines; automation of production lines has improved considerably thanks to technological developments and the introduction of half pallet and quarter pallet; hence, the way goods are being handled has changed to a significant extent.

According to the latest data from Ucima (Association of Italian Manufacturers of Automatic Packaging Machines), Italian manufacturers in this industry closed last year with a market value of approximately eight billion Euros, approximately 3% less than 2021.

The result should take into account the recent geo-political environment, marked by considerably delayed deliveries of components and heavy increases in the cost of raw materials, energy and transport, that have forced important choices to reduce consumption.

Nevertheless, this industry is in good health, with purchase orders already received for the first seven and a half months of 2023. In particular, end-of-line packaging plays a more and more strategic role with regards to productivity, efficiency and safety.

The Contribution of Tosa Group “To See Where Others Simply Look”

Tosa was established in the late Seventies as a workshop for machines on demand, with a special attention to packaging machines. The company grew rapidly; to meet the demand of a growing market of end-of-line machines, in 1998 Tosa acquires CMR, a specialist of high quality strapping machines. A few years later, in the early 2000s, follows the acquisition of company MIMI, a pioneer of heat shrinkage technology. TOSA Group results from the combination of these companies and it presents itself on the market to meet a great variety of demands with a full range of packaging systems sold all over the world.

For over forty years, the group has adopted a strategy based on a careful observation of the market to be able to advance its needs; they still follow this trend with constant innovation we will mention in the following.



Tosa Group includes Tosa, MIMI and CMR, each one with its specialised domain

AN ALL-ROUND ECO-FRIENDLY CHOICE

Since 2011 Tosa Group's headquarter is in Santo Stefano Belbo (Cuneo province). The building was designed aiming at energy saving and efficiency as well. These are the same criteria applied in the machine construction, both in terms of easy accessibility, user-friendliness, comfort: from skylights to heated floors, from the use of bore water together with water from the aqueduct, from a high energy efficiency class to the human design of rooms aimed at maximising the experience of the team, everything has been considered in view of environmental and corporate sustainability.



Internal and external view of the headquarters in Santo Stefano Belbo

RELIABILITY AND LONGEVITY OF END-OF-LINE MACHINES

Tosa mainly makes wrapping machines either with rotating platform (entry level products to pack 30-40 pallets per hour), rotating arm or rotating ring (top of the range, to pack 150-160 pallets per hour).

The machines feature a very long lifecycle, over 25 years; in fact, they require low maintenance and feature design criteria conceived to reduce both energy and raw

materials usage.

A good example is Tosa Juracan, mentioned above, the result of an in-depth project research which, also considering the consequences on the market of the current geo-political situation, aimed at reaching the right balance between the amount of iron composing the machine structure, that substantially impacts its cost, and energy consumption generated from the power of motors. Stability and robustness of the machine are ensured also through counterweight systems on the lifting units of the rotating ring.

FUTURE PROSPECTS: ENERGY REUSE AND DEFORMABLE PAPER

Tosa Group realizes fully customised machines both for large multinational companies and for SMEs, which, like the former, have in recent years, shown a growing attention for methods to reduce their carbon footprint, automate industrial processes and curb consumption, also driven by a greater social responsibility.



Types of machines made by Tosa. From left: with rotating platform, rotating arm. Above: rotating ring.

It is precisely to this end that the company, always focused on innovation, recently launched a master's degree dissertation project followed by an internship devoted to the improvement of energy efficiency in production processes and TOSA machines, based on installation and application of solar panels and implementation of the recovery and reuse of energy generated from the movements on the machines.

Nowadays, a major challenge of packaging is complementing plastic film with the use of paper to stabilize goods. One of the main challenges in packaging today is to complement plastic film with the use of paper to stabilise goods. Although the packaging market is still in an early stage when it comes to this, significant technological breakthroughs are already being made, taking in due consideration the fact that paper, that six months ago was four times more expensive, now costs just twice as much.

Furthermore, it is important to draw attention on the increasingly greener processes companies shall adhere to and on which direction this market is taking: several multinational companies aim at cancelling within 2025 primary and secondary non-recyclable or reusable plastic packaging. These reasons pushed Tosa Group to invest in research: Tosa Group already proposed a special paper that is deformable by up to 40%; which earned the company the "Materials for the Future" award at the 2022 ALL4PACK exhibition in Paris. This special paper suits the perimeter of palletised products much better than standard Kraft paper; thus, increasing stability and safety while expanding the areas of use until now mainly limited to food & beverage.

Conclusions

When developing a holistic sustainability strategy, Roland Berger suggests that companies consider some key areas, each covering a different step of the value chain:

- **Conscious use of resources and establishment of strategic partnerships at an ecosystem level,**
- **Sustainability oriented design and production,**
- **Re-use.**

This full review process should include evaluating both available skills and resources, a critical review of processes and of the organization structure, optimisation of the product portfolio and assessing new business models.

Furthermore, manufacturers should develop a clear investment strategy exploiting their actual R&D capacity and guiding their total conversion to sustainability. In order to fill the gaps, even dedicated industrial acquisitions might be a viable option. What is out of question is the fact that the trend towards sustainability is here to stay and will grow over time.

As we could see in the Tosa Group example, businesses have the important opportunity to build a competitive advantage, implementing a clearly defined strategy, developing technological skills and building a position of strength within the ecosystem of packaging and production.

Final Keypoints

- A globalised market, new logistic challenges, the urgent demand to reduce consumption force machine manufacturers to make increasingly sustainable choices
- In order to keep pace, one has to aim at continuous innovation, through increasingly efficient machinery and processes
- Tosa Group offers its all-round approach to sustainability, attention to details and new solutions for an ever-changing world.

